



TGA Licence No:
MI-15112007-LI-002191-11

APVMA Licence No:
6139

AS/NZS 4020:2005 Compliance Testing

Certificate of Analysis
(Supersedes all interim reporting)
Dated: 11/12/2015

1. CERTIFICATE OF ANALYSIS AND SAMPLE INFORMATION:

Methodology: AS/NZS 4020, *Appendix A* and in-house method TMP-191100 & TMP-191101

AMS Report Reference No.: 1520236

Cross Reference No.: NA

Submitting Organisation: Thiensurat Public Company Limited

Contact: Kanorkkan Jalearnmee

Address: 43/9 Moo 7, Soi Chu Chat Anuson 4, Bangtalad, Pak Kret, Nonthaburi 11120, Thailand

Interim Reporting: NA

Project Completion Date: 11/12/2015

Product Designation: Safe Alkaline Mini and Giffarine Alkaline Compact,
Model No.: TR-CT-01

Batch No./ Manufacturing Date: Not Provided

Product Manufacturer: Thiensurat Public Company Limited
43/9 Moo 7, Soi Chu Chat Anuson 4, Bangtalad, Pak Kret, Nonthaburi 11120, Thailand

Sampling Organisation: QA Department (Thiensurat Public Company Limited)

General Composition: Refer to Attachment A

Product Use: End-of-Line

THIS REPORT MUST NOT BE REPRODUCED EXCEPT IN FULL

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BRISBANE A 2/120 Bluestone Circuit, Seventeen Mile Rocks QLD 4073 P +61 2 9704 2350 F +61 2 9704 2355

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ams Laboratory Final Report for the testing of a product to AS/NZS 4020, Products for use in contact with Drinking Water	AMS Report No.: 1520236
Submitting Organisation: Thiensurat Public Company Limited	
Product: Safe Alkaline Mini and Giffarine Alkaline Compact, Model No.: TR-CT-01	Date of Report: 11/12/2015

Temperature Range:	(22 – 40)°C
Previous Testing:	NA
Date of receipt of samples:	25/08/2015
Sample selection for tests:	As provided by the Submitting Organisation
Sample storage conditions:	Prepared and controlled as per AS/NZS 4020, <i>Appendix A</i>
Extracts:	Prepared as per AS/NZS 4020, <i>Appendices C, D, E, F, G & H</i>
Testing procedure:	Testing is based on the recommended 'in-the-product' exposure of intact unit at (20 ± 2)°C to cover a cold water application up to <40°C. Refer to Attachment A for Photos of test sample and Product Composition Details.
Volume retention:	~500mL

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2. SUMMARY OF RESULTS:

APPENDIX	RESULTS
C - TASTE	PASS at testing exposure
D - APPEARANCE	PASS at testing exposure
E - GROWTH OF AQUATIC MICRO-ORGANISMS	PASS at testing exposure
F - CYTOTOXIC ACTIVITY	PASS at testing exposure
G - MUTAGENIC ACTIVITY	PASS at testing exposure
H - EXTRACTION OF METALS	PASS at testing exposure

Based on completion and evaluation of all tests on 11/12/2015, the product, **Safe Alkaline Mini and Giffarine Alkaline Compact, Model No.: TR-CT-01**; **fully complied with the test requirements of AS/NZS 4020:2005 to cover a cold water application up to <40°C, at the recommended 'in-the-product' exposure of intact unit at (20 ± 2)°C.**

Testing although determined by the relevant product Standard, is generally recognised for up to 5 years by the certifying body, providing the testing procedures remain the same, and the background information on all wetted parts and the product are adequately documented. Also, the results stated in the report relate to the samples of the product submitted for testing. Any changes in the material formulation and supplier/manufacturer of all wetted items, the process of manufacture, the method of application, or the surface area-to-volume ratio in the end-use, could affect the suitability of the product for use in contact with drinking water, and re-testing may be required before this actual time frame, governed by the completion and evaluation date.

Signed: _____



Date: 11/12/2015

SANDHYA L. SINGH B. Tech, Postgrad. Dip. (Chem)
 Manager, Chemistry and Toxicology; Approved Signatory

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3. TASTE OF WATER EXTRACT:

Methodology: AS/NZS 4020, *Appendix C* and in-house method TMP-191130.

Exposure: 'in-the-product'

Extraction temperature: (20 ± 2)°C **Scaling factor:** NA **Number of Panellists:** 4

No. of samples for Chlorine-free extract: 2

Description	Extract	Test Water	Taste (+ / -)	Taste Description (No. of tasters)	Test Dilution *(Taste intensity)
Test Blank	First 24h	Chlorine-free	-	-	-
	Final 9-day	Chlorine-free	NA	NA	NA
Sample I	First 24h	Chlorine-free	-	-	-
	Final 9-day	Chlorine-free	NA	NA	NA
Sample II	First 24h	Chlorine-free	-	-	-
	Final 9-day	Chlorine-free	NA	NA	NA

+ Taste detected - No taste detected NA Not applicable

AS/NZS 4020 test requirement: Minimum of 4 tasters with no discernible taste at the first 1/2 dilution.

Figure in brackets is the number of panellists detecting a taste at this dilution

Note:

1. Tasters are given a 14-point scale to describe its intensity, with minimum of 1 as extremely weak, and maximum of >14 as extremely strong. An average of all tasters represents taste intensity.
2. First extract becomes final extract.

EVALUATION:

On the basis of these results the samples of this product referred to in this report have complied with the test requirements of AS/NZS 4020:2005, Taste of Water Extract; *Appendix C*.

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4. APPEARANCE OF WATER EXTRACT:

Methodology: AS/NZS 4020, *Appendix D* and in-house methods TMP-191140 and TMP-191106.

Exposure: 'in-the-product'

Extraction temperature: (20 ± 2)°C **Scaling factor:** NA

No. of samples tested: 1

	a) TRUE COLOUR: Hazen Units (HU)		b) TURBIDITY: Nephelometric Turbidity Units (NTU)	
	First 24h	Final 9-day	First 24h	Final 9-day
Sample Extract pH = 5.52	2	NA	0.24	NA
Test Blank pH = 5.62	<2	NA	0.20	NA
FINAL RESULT	2	NA	0.04	NA
AS/NZS 4020 Test sample requirements	≤5		≤0.5	

< = less than

≤ = less than or equal to

NA Not applicable

First extract becomes final extract

For test a), test extractions were performed by AMS Laboratories Pty. Ltd. The test extracts were subsequently subcontracted to National Measurement Institute for assessment (NATA Accreditation No. 198), Report No. RN1084035.

EVALUATION:

On the basis of these results the samples of this product referred to in this report have complied with the test requirements of AS/NZS 4020:2005, Appearance of Water Extract; *Appendix D*.

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5. GROWTH OF AQUATIC MICRO-ORGANISMS:

Methodology: AS/NZS 4020, *Appendix E* and in-house method TMP-191150.

Incubation temperature: (30 ± 1)°C

Exposure: 'total immersion'

Component Name	Testing Exposure	Inoculum (mL)	* MEAN DISSOLVED OXYGEN DIFFERENCE (MDOD) in mg/L
i) 1st Filter Column / 1L	15,000mm ² / 1L	100	0.48
ii) 2nd Filter Column / 1L	15,000mm ² / 1L	100	0.39
iii) Nylon Filter Cloth (#5)	2 / 0.5L	50	0.32
iv) PE Filter Cloth (#6)	5 / 0.5L	50	0.31
v) Connector III (#14)	3 / 1L	100	0.47
vi) Connector IV (#15)	5 / 1L	100	0.44
vii) O-ring 3x76mm (#16)	3 / 1L	100	0.26
viii) PP Filter (#18)	15,000mm ² / 1L	100	-0.09
ix) Pre Filter Cap (#19)	2 / 1L	100	0.22
x) PE Tube (#21)	15,000mm ² / 1L	100	0.24
xi) Pre Filter Housing I (#23)	1 / 1L	100	0.20
xii) Membrane Housing 4/4 + O-rings (#20)	15,000mm ² + 2 / 1L	100	0.34
Negative Reference Control (glass plate)	~15,000mm ² / 1L	100	0.20
Positive Reference Control (paraffin waxed glass plate)	~15,000mm ² / 1L	100	8.63
Test Blank	Blank / 1L	100	7.30 in mg/L as mean dissolved oxygen

NA Not applicable

* Difference from test blank and represents mean of triplicate readings (weeks 5, 6, 7)

AS/NZS 4020 test sample requirements: Less than or equal to 2.4 for MDOD

EVALUATION:

On the basis of these results the samples of this product referred to in this report have complied with the test requirements of AS/NZS 4020:2005, Growth of Aquatic Micro-organisms; *Appendix E*.

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6. CYTOTOXIC ACTIVITY OF WATER EXTRACT:

Methodology: AS/NZS 4020, *Appendix F* and in-house method TMP-191160.

Exposure: 'in-the-product'

Extraction temperature: (20 ± 2)°C **Scaling factor:** NA **Extracts:** 24h, 48h & 72h

No. of samples tested: 1

The test sample extracts from the product, as well as the test blank (test water) were used to prepare a nutrient growth medium, subsequently utilised to grow a monkey kidney cell line (VERO ATCC CCL 81).

Microscopic Examination	Test Sample Extract (24h, 48h and 72h)	Test Blank (24h, 48h and 72h)
Cell Morphology:	Satisfactory	Satisfactory
Monolayer: Confluence/Healthy Growth as ~%	100%	100%

Cytotoxicity was detected with zinc sulphate, used as a positive control and analysed at 4µg/g, 8µg/g and 16µg/g of zinc. Water for Irrigation, Synthetic Water for Irrigation, and Phosphate Buffer Solution were included with the test blank as negative controls.

AS/NZS 4020 test sample requirements: 1) Non-cytotoxic response- confluent monolayer similar to test blank.
2) Cytotoxic response- irregularly shaped cells & cell death similar to positive controls of 8µg/g & 16µg/g zinc sulphate.

EVALUATION:

On the basis of these results the samples of this product referred to in this report have complied with the test requirements of AS/NZS 4020:2005, Cytotoxic Activity of Water Extract; *Appendix F*.

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7. MUTAGENIC ACTIVITY OF WATER EXTRACT:

Methodology: AS/NZS 4020, *Appendix G* and in-house method TMP-191170.

Exposure: 'in-the-product'

Extraction temperature: (20 ± 2)°C

Scaling factor: NA

Extract: 24h

No. of samples tested: 1

BACTERIAL STRAIN: <i>Salmonella typhimurium</i>	* S9 -No +With	a) TRIPLICATES (REVERTANTS/PLATES) DEVIATION		b) MEAN ± STANDARD	
		TEST BLANK (Extractant Water)	SAMPLE EXTRACT (Leachate)	NEGATIVE CONTROL (Test culture only)	POSITIVE CONTROL (Standard diagnostic mutagen)
TA 98	-	a)	a)	a)	a)
		117 55 44	218 130 282	42 33 40	IV 2,870 2,610 2,700
		b)	b)	b)	b)
		72 ± 39	210 ± 76	38 ± 5	2,727 ± 132
TA 98	+	a)	a)	a)	a)
		67 45 52	47 45 50	39 37 39	IV 1,600 1,340 1,420
		b)	b)	b)	b)
		55 ± 11	47 ± 3	38 ± 1	1,453 ± 133
TA 100	-	a)	a)	a)	a)
		194 200 156	140 171 149	193 187 180	II 3,160 3,000 3,020
		b)	b)	b)	b)
		183 ± 24	153 ± 16	187 ± 7	3,060 ± 87

* Metabolic Activator NA = Not applicable > = greater than I = 2, 4-dinitrophenylhydrazine
 II = sodium azide III = Benzo(a)pyrene IV = 2-aminoanthracene

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BACTERIAL STRAIN: <i>Salmonella typhimurium</i>	* S9 -No +With	a) TRIPLICATES (REVERTANTS/PLATES) DEVIATION		b) MEAN ± STANDARD	
		TEST BLANK (Extractant Water)	SAMPLE EXTRACT (Leachate)	NEGATIVE CONTROL (Test culture only)	POSITIVE CONTROL (Standard diagnostic mutagen)
TA 100	+	a) 200 167 174	a) 177 187 186	a) 174 180 170	a) III 2,810 2,560 2,500
		b) 180 ± 17	b) 183 ± 6	b) 175 ± 5	b) 2,623 ± 164
TA 102	-	a) 260 324 300	a) 280 278 320	a) 346 320 318	a) I 3,100 3,020 3,080
		b) 295 ± 32	b) 293 ± 24	b) 328 ± 16	b) 3,067 ± 42
TA 102	+	a) 399 517 591	a) 529 512 502	a) 632 646 630	a) IV 5,570 5,000 4,980
		b) 502 ± 97	b) 514 ± 14	b) 636 ± 9	b) 5,183 ± 335

* Metabolic Activator NA = Not applicable > = greater than I = 2, 4-dinitrophenylhydrazine
 II = sodium azide III = Benzo(a)pyrene IV = 2-aminoanthracene

AS/NZS 4020 test sample requirements: (The differences in the mean number of revertants between either of the negative controls and test sample extracts should not exceed two standard deviations (for triplicate analysis)).

Positive response: If mean revertants for sample extract outside the range of spontaneous revertants for test strain.

EVALUATION:

On the basis of these results the samples of this product referred to in this report have complied with the test requirements of AS/NZS 4020:2005, Mutagenic Activity of Water Extract; *Appendix G*.

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8. EXTRACTION OF METALS:

Methodology: AS/NZS 4020, *Appendix H* and in-house methods TMP-191180 and TMP-191230.

Exposure: 'in-the-product'

Extraction temperature: (20 ± 2)°C

Scaling factor: NA

Extracts: 24h

No. of samples for I: 1

No. of samples for II: 1

Element	In-House Method	AS/NZS 4020: Maximum Allowable Concentration mg/L (ppm)	Limit of Reporting mg/L (ppm)	Test Blank mg/L (ppm)	Sample Extract I mg/L (ppm)	Sample Extract II mg/L (ppm)	FINAL RESULT I mg/L (ppm)	FINAL RESULT II mg/L (ppm)
antimony ¹ (Sb)	NT2_47	0.003	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
arsenic ² (As)	NT247_251	0.007	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
barium ¹ (Ba)	NT2_47	0.7	0.001	0.014	0.003	0.015	<0.001	0.001
cadmium ¹ (Cd)	NT2_47	0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
chromium ¹ (Cr)	NT2_47	0.05	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
copper ¹ (Cu)	NT2_47	2	0.001	0.057	<0.001	0.017	<0.001	<0.001
lead ¹ (Pb)	NT2_47	0.01	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
mercury ³ (Hg)	NT2_47_244	0.001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
molybdenum ¹ (Mo)	NT2_47	0.05	0.001	<0.001	0.002	<0.001	0.002	<0.001
nickel ¹ (Ni)	NT2_47	0.02	0.001	<0.001	<0.001	0.002	<0.001	0.002
selenium ² (Se)	NT247_251	0.01	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
silver ¹ (Ag)	NT2_47	0.1	0.001	<0.001	<0.001	0.019	<0.001	0.019

< = less than mg/L = milligram per litre ¹ = ICPMS ² = ICPMS (hydride generation) ³ = CVAAS
First extract becomes final extract.

Test extractions were performed by AMS Laboratories Pty. Ltd. The test extracts were subsequently subcontracted to National Measurement Institute for assessment (NATA Accreditation No. 198), Report No. RN1084036.

EVALUATION:

On the basis of these results the samples of this product referred to in this report have complied with the test requirements of AS/NZS 4020:2005, Extraction of Metals; *Appendix H*.